Appendix A

Weighting Function for W126 Ground-level Ozone Exposure Index

The W126 ozone exposure index is represented as the sum of all hourly ozone concentrations, where each measured concentration is weighted by a function, w_i, to assign greater emphasis to the higher measured concentrations. This weighting function provides a weighting value that is unique for each hourly ozone concentration. The weighting function, as described by Lefohn et al. [1988] is:

$$w_i = \frac{1}{1 + 4403\exp(-0.126c_i)}$$

where

w_i = weighting value for hourly concentration *i*, and
c_i = hourly concentration i in ppb.

The graph of weighting value versus ozone concentration illustrates the greater weights given to higher hourly ozone concentrations (Figure A-1). Each hour's weighting value is multiplied by its corresponding hourly concentration. This product is summed over all valid hours to calculate the W126 exposure. Thus, the W126 exposure is:
where

W126 = W126 exposure index, and
n = number of hours with valid ozone concentrations.

The exposure unit for both indices are parts per million-hours (ppm-hr). As in the case of the SUM06 index, W126 exposures are calculated using values measured during the 12 hours from 8 AM to 8 PM in the months of May through September of each year.

$$W126 = \sum_{i=1}^{n} w_i c_i$$

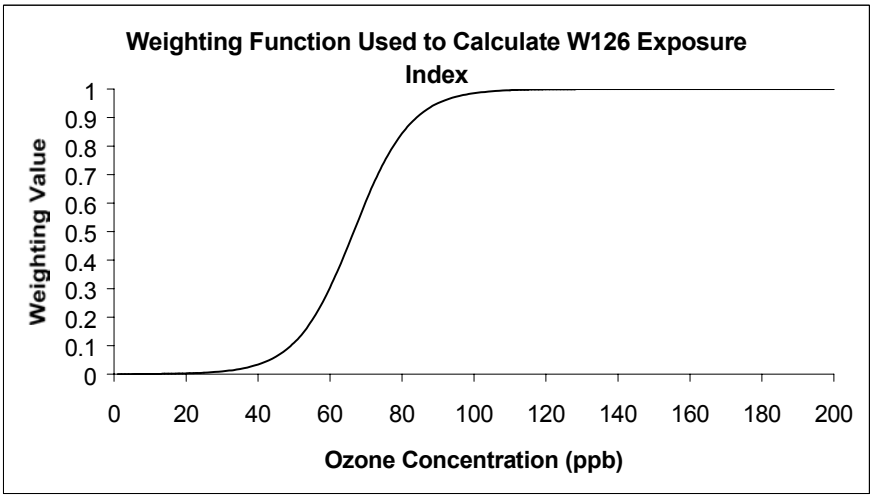

Figure A-1. Weighting function used to calculate the W126 ozone exposure index (Lefohn et al. 1988).

References

Lefohn A. S., J.A. Laurence, and R.J. Kohut. 1988. A comparison of indices that describe the relationship between exposure to ozone and reduction in the yield of agricultural crops. Atmospheric Environment 22:1229-1240.